

### Applicator

The present invention relates to applicators and more particularly to applicators for insertion and closure of surgical clips.

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Such clips may be for sterilisation or other medical, orthopaedic or surgical purposes where an intermediate position of an applicator or other appliance is required to be able to be accurately determined.

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The term applicator is thus meant to include other appliances, particularly in the medical field, which involve a closure of a jaw or other similar gripping or squeezing action in which a specific intermediate position is required to be determined.

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The present invention will now be described with reference to applicators for surgical clips. Except in open surgery it is necessary for the applicator to be inserted down a cannula for the more modern "key hole" surgery. Thus, the applicator or more precisely barrel portion of the applicator has to pass down the cannula loaded with a clip to be attached for occlusion of,

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example a vas deferens or other tubular member.

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With clips of the Filshie type such as disclosed in GB patent no. 2177748 excessive force applied to the clip during passage of the barrel down the cannula can result in clip failure. The clip could fall out of the barrel once it emerges from the cannula or alternatively the clip could fail by incorrect closure.

The present invention seeks to obviate this problem by providing a visual indication of an intermediate position of the applicator to ensure that there is

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no over-closure of a clip during passage of an applicator barrel down a cannula.

The present invention therefore provides an applicator, said applicator  
5 comprising a barrel portion and a handle portion attached thereto, said  
barrel portion comprising means for holding a surgical clip and said handle  
comprising trigger means said trigger means being operative to effect  
closure of a surgical clip held within said barrel by movement of said  
trigger from a first position to a second position at which second position  
10 said applicator is operative to effect closure of said clip, in which said  
trigger is provided with a visual indicator means indicative of an  
intermediate trigger position at which intermediate position said surgical  
clip held in said barrel is closed to a half closed position.

15 Preferably said visual indication comprises an indentation on said trigger.

Alternatively said visual indication comprises a reduced section of said  
trigger.

20 In a further embodiment said visual indication comprises groove means in  
said trigger.

In said further embodiment said groove means may comprise means for  
engaging with a removable stop means said removable stop means being  
25 co-operative with a portion of said handle to prevent movement of said  
trigger past a predetermined position.

Preferably said groove means is present on both sides of said trigger.

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Preferably said stop means may comprise a U shaped member which is designed in a first locking position to sit within said groove means and to protrude from said groove means to form said stop means.

- 5 Preferably said U shaped member comprises spring steel or similar material ensuring secure engagement with said groove means.

Preferably said U shaped member comprises means for gripping by a surgeon to effect removal of said U shaped member from said trigger  
10 enabling movement of said trigger past said predetermined position.

In a further embodiment the trigger may comprise two or more colours arranged to identify specific portions of the trigger.

- 15 In a further embodiment the handle includes a recess the trigger being pivotally mounted within the handle the trigger being movable into said recess when said trigger is operated, in which the trigger is dimensioned to have minimal clearance between itself and the recess over substantially the whole pivotal movement of the trigger.

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Preferably the visual indicator means is provided by a change of surface texture at a defined position across the trigger.

- 25 This change of surface texture will provide a visual indication of the defined position without any substantial variation of the surface dimension of the trigger.

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The advantage of this design feature is that as the trigger is moved into and out of the handle there will be no appreciable gap between the trigger and the recess of the handle.

5 In surgical operation surgical gloves are worn and if there is any substantial gap between the trigger and the recess as the trigger is operated then there is a possibility of a glove catching between the trigger and the recess and being torn. This would create hygienic problems were it to occur and thus this feature is an important advantage of this embodiment.

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The visual indication feature is further enhanced by the pressure felt by the surgeon on the trigger as the clip is partially closed.

The present invention also provides an applicator comprising a handle  
15 portion and a barrel portion, said barrel portion having gripping means at a distal end from said handle portion for gripping an object in which said handle portion includes trigger means operative to move into and out of a main body portion of said handle and being operative to move said gripping means to grip an object and in which said trigger means is provided with  
20 visual indication means indicating a defined intermediate position of said trigger means, said unusual indicator comprising a change in surface texture at an defined intermediate position said surface texture change being dimensioned such that the clearance between the trigger means and said main body portion is minimal, thereby removing the possibility of snagging  
25 surgical gloves on movement of the trigger.

Embodiments of the present invention will now be described by reference to the accompanying drawings in which: -

Figure 1 shows an applicator for clips of the Filshie type;

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Figure 2 shown in greater detail the operating handle of the applicator of Figure 1 in accordance with the present invention;

Figure 3 shows a first embodiment of the visual indication means according to the present invention;

5        Figures 4a and 4b show a second embodiment with the trigger in two positions;

Figure 5 shows a first embodiment of the U shaped member comprising the stop means;

10        Figure 6 shows a second embodiment of the U shaped member comprising said stop means,

Figure 7 shows a further embodiment of the application according to the present invention in perspective view,

15        Figure 7a and 7b showing a portion of the trigger and main body portion of the handle in cross section with an enlarged portion illustrating the change in texture feature,

Figure 8 shows a partial cross section of the applicator of Figure 7 illustrating the operation of the trigger and,

Figure 9 shows an exploded view of the applicator of Figure 7.

20        With reference now to the drawings an applicator 10 for applying clips of the Filshie type (as described in European patent application no. 03075212.5) is shown. Such clips are of the hinged type and will be hereinafter referred to as Filshie clips.

25        The applicator 10 comprises a barrel portion 12 and a handle portion 14 including a trigger 16.

The applicator is designed to pass down a relatively small diameter cannula 18.

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In order to do so it is necessary for the Filshie clip to pass down the cannula whilst in position in the applicator at the end of barrel 12. For a more detailed description reference is made to PCT application no.

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A problem which arises is that if the clip is closed too far by application of trigger 16 then the clip may partially latch and the clip will not subsequently be able to be correctly attached.

10 To enable the surgeon to ascertain the correct position of the trigger to achieve the half closed position the trigger and handle combination is provided with visual indication means 20 as indicated in Figure 2.

15 This visual indication means preferably comprises an elongate linear feature easily discernible by a surgeon enabling the surgeon to readily set the trigger to a correct position.

20 The visual indicator may also comprise means for physically preventing further movement of the trigger past the correct semi-closed position of the clip this being illustrated hereinafter with reference to Figures 4, 5 and 6.

25 With reference to Figure 2 the visual indicator 20 marks a position at which with trigger 16 is moved on pivot 142 against for example return spring 140 the clip positioned at the distal end of barrel 12 will be in a semi-closed position.

Preferably the visual indicator line 20 will exist for a substantial distance over the trigger to provide a visual indication even when the trigger is being gripped by one or more of the digits of a surgeons hand.

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In Figure 2 a section of the trigger along line A-A is shown for various embodiments illustrated in Figures 3 to 6.

- 5 In Figure 3 the trigger 14 is provided with a dual thickness shape shown at 202, 203 the change in thickness providing the visual indication 20.

In Figures 4a and 4b a groove 206, 208 is provided, preferably on both sides of the trigger.

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The groove can provide the visual indication itself but in a specific embodiment a U shaped member 210 (see Figures 5 and 6) is inserted along the groove.

- 15 For illustrative purposes an edge portion 144, 146 of handle 14 is shown illustrating that when trigger 16 is pulled back the U shaped member 210 abuts the edges 144, 146 and physically prevents further movement of the trigger.

- 20 The U shaped member 210 is shown in a first embodiment in Figure 5 and preferably comprises a spring steel member allowing it to grip the grooves in trigger 16. Alternatively a suitable rigid plastic material may be used.

- 25 In Figure 6 the U shaped member is provided with gripping means 212 facilitating easy removal once capable closure of the Filshie clip is required.

The visual indication 20 may also be provided or enhanced by a change in colour of the trigger along line 20.



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With reference now to Figure 7 in an alternative embodiment the trigger 16 comprises two separate surface features.

One part 162 (which could be the forward part on the rearward part) is provided with a surface texture whilst the other part 164 is a different surface texture which could for example be smooth. The advantage of this embodiment is that the trigger can be moulded from a single, preferably plastics, injection without use of a colouring agent in part of the trigger and also because the texturing can be made to raise or lower the surface by only a very small amount, possibly a few microns, the trigger can be made to slide into and out of the recess 1420 (shown exploded in Figure 9) with minimal clearance. This is shown clearly in Figure 7a and 7b, Figure 7a showing a cross section through a portion of the handle 14 and trigger 16 and Figure 7b showing a magnified view of a section of the trigger 16 showing the edges surfaces 162 and 164 and illustrating the minimal change in surface dimension.

This removes the possibility of snagging or catching the surgical gloves of a surgeon whilst operating the applicator.

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Additionally the amount of textured (or untextured) trigger left exposed as the trigger is pressed allows the surgeon a first appraisal of the level of clip closure and, as explained with reference to Figure 8 the applicator trigger will increasingly provide a feedback pressure as a clip is squeezed to a half closed position. Thus the surgeon can feel the clip pressure and look at the position of the textured line in the handle to provide visual and tactile approval of the position of the clip.

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In Figure 8 the trigger 16 is movable on a pivot 1600 and drives the clip closure mechanism 1400 via a rack and pinion drive 1402.

As the trigger 16 moves in the direction of arrow 1610 to close the clip a  
5 feedback pressure is felt on the trigger 16 by the surgeon combining with  
the position of texture change line 163 to provide the surgeon with a tactile  
as well as visual indication.

Figure 9 shows the applicator in an exploded form to provide a further  
10 explanation of the embodiment of Figure 7.